

REMARKS

Claim 1-24 are pending. Claims 12, and 15-20 have been amended. Claims 22-24 have been added. Reexamination and reconsideration of this application is respectfully requested.

In the September 26, 2003 Office Action, the Examiner rejected claims 12-21 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,983,291 to Chau ("the Chau reference"). The Examiner also objected to claims 15-20 as reading as method claims in the preamble, yet depending from a product claim. The Examiner rejected claims 1-11 under U.S.C. § 103(a) as being unpatentable over the Chau reference in light of U.S. Patent No. 6,245,234 to Koo ("the Koo reference"). The Examiner's rejections and objections are respectfully traversed.

The pending claims of the present invention are directed to filtration membranes for separating a contaminant from a feed fluid to produce a product fluid and methods for producing the membranes. Such membranes may be used in a number of commercial applications in which a contaminant, such as salt, must be separated from a feed fluid, such as brackish water, to yield a purified product fluid. The membranes exhibit superior salt rejection and flux properties. Claim 12, as amended, recites:

A filtration membrane for separating a contaminant from a feed fluid to produce a product fluid, said membrane comprising:

a porous substrate having a first surface; and
a product fluid-permeable layer cast on said first surface of said porous substrate, said layer comprising the interfacial polymerization reaction product of an aqueous amine solution and an acyl halide solution, wherein

said aqueous amine solution includes an amine, propionic acid and a non-amine base,

said acyl halide solution includes an acyl halide and an organic solvent, and

wherein the filtration membrane exhibits about 98% to 99.5% magnesium sulfate rejection and fluid fluxes of about 70 to 100 gallons/ft² per day for an aqueous magnesium sulfate solution at about 2000 ppm at about 100 psi and about 77° Fahrenheit.

The Chau reference is directed to semipermeable membranes, which comprise the polymerized reaction product of an aqueous solution of a polyamine, which may contain a polar aprotic solvent, not reactive with the amines, a polyhydric compound and an acid acceptor. The semipermeable membranes are prepared from depositing the polymerized reaction product within and/or on a porous substrate backing material. Specifically, the Chau reference discloses contacting a porous support such as polysulfone with the polymerized reaction product. The surface of the coated support is freed of excess solution and thereafter contacted with an organic solution of polyacyl halide for a period of time sufficient to form a polymerized reaction product within and/or on the support material. The resulting composite is then treated with a hydroxy polycarboxylic acid, polyaminoalkylene polycarboxylic acid, sulfonic acid, amine salts of acids, amino acid, amino acid salt, polymeric acid and inorganic acid, before drying the membrane. The membranes showed a mere 30.5 gfd flux and 98.1 salt rejection rate at 24 degrees Celsius, 220 psig and a 2 gram/liter solution of sodium chloride.

In the September 26, 2003 Office Action, the Examiner states that the Chau reference clearly anticipates the elements of claim 12. However, the reference does

not teach, suggest, or disclose a filtration membrane *wherein the filtration membrane exhibits about 98% to 99.5% magnesium sulfate rejection and fluid fluxes of about 70 to 100 gallons/ft² per day for an aqueous magnesium sulfate solution at about 2000 ppm at about 100 psi and about 77° Fahrenheit*, as recited by independent claim 12, as amended.

The filtration membrane of independent claim 12, as amended, exhibits fluid fluxes two to three times greater than the fluid fluxes of the Chau patent under similar conditions. As the Chau reference does not disclose these superior flux parameters, the present invention overcomes the cited art and the Examiner's rejection of claims 12-21 based on 35 U.S.C. § 102 is traversed.

Moreover, the Examiner correctly notes that the Chau reference does not disclose the use of propionic acid in the preparation of its filtration membrane. Different acids can react in a variety of different ways with the same reactant. It would not have been obvious that replacing one acid with another would produce the same result, and it therefore would not have been obvious to use propionic acid in the method of Chau. In fact, the use of proprionic acid in the present invention has the unexpected result of improving the flux characteristics of the filtration membrane. Nor does the Koo reference teach, disclose or suggest propionic acid used in an amine solution with an amine and a non-amine base. The Koo reference merely discloses the addition of a reaction product of a polyfunctional tertiary amine and proprionic anhydride to a solution to an aqueous solution including a polyfunctional amine. Only by including the product of both reactants does Koo disclose an increase in flux. It does not teach, disclose or suggest the use of proprionic acid in preparing a filtration membrane or even that the

use of propionic anhydride, let alone that propionic acid, would increase the flux of a filtration membrane. The present invention does not require the use of a polyfunctional tertiary amine to produce the superior flux properties. Therefore, the present claims are not obvious under 35 U.S.C. § 103 or anticipated under 35 U.S.C. §102 by Chau alone or in combination with Koo.

Furthermore, the Koo reference cannot make up for the deficiencies of Chau. The Koo reference only discloses fluid fluxes of only as high as about 50 gfd without substantially decreasing the rejection % under a pressure of 225 psi, which is much higher than the 100 psi. that may be use in the present invention to obtain superior results. The Applicant thus believes that the claims are allowable.

The Applicant believes that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

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